Hard maple

Sugar maple: *Acer saccharum*
Black maple: *Acer nigrum*

Hard maples are slow-growing, shade-tolerant species. Sugar maple is the most important species making up the maple-basswood forest type of northern Wisconsin. The **volume of hard maple has increased** by almost 50% since 1983 but hasn't changed since 1996.

Growth rates have remained unchanged and **mortality has decreased**. Hard maple accounts for about 10% of all volume and growth of trees in Wisconsin, but only 2.2% of total mortality.

Hard maple is **an important timber species**, accounting for 14% of roundwood production. Because of the high density of its wood and the large volume in the state, hard maple may be a valuable species for woody biomass production.

- *How has the hard maple resource changed?*
  Volume and diameter class distribution: 1983, 1996, and 2008
- *Where does hard maple grow in Wisconsin?*
  Growing stock volume by region with map
- *How fast is hard maple growing?*
  Average annual net growth by region and year: 1983, 1996, and 2008
- *How healthy is hard maple in Wisconsin?*
  Average annual mortality: 1983, 1996, and 2008
- *How much hard maple do we harvest?*
  Roundwood production by product and year: 1997, 2003, and 2006
- *How much is hard maple selling for?*
  Prices for cordwood and sawtimber: 2000 to present
- *How much hard maple biomass do we have?*
  Oven-dry tons by region of the state: 2008

"How has the hard maple resource changed?"

Growing stock volume and diameter class distribution by year

The growing stock volume of hard maple in 2008 was about 2.3 billion cft or 10.7% of total volume in the state (Chart 1). This is an increase of 43% since 1983. Volume has remained unchanged since 1996.

Hard maple growing stock has matured since 1983 with a greater increase in the volume of large sawtimber than on smaller trees (Chart 2).

The numbers of seedlings and sawtimber trees have increased since 1996 but the numbers of saplings and poles have decreased (Chart 3).

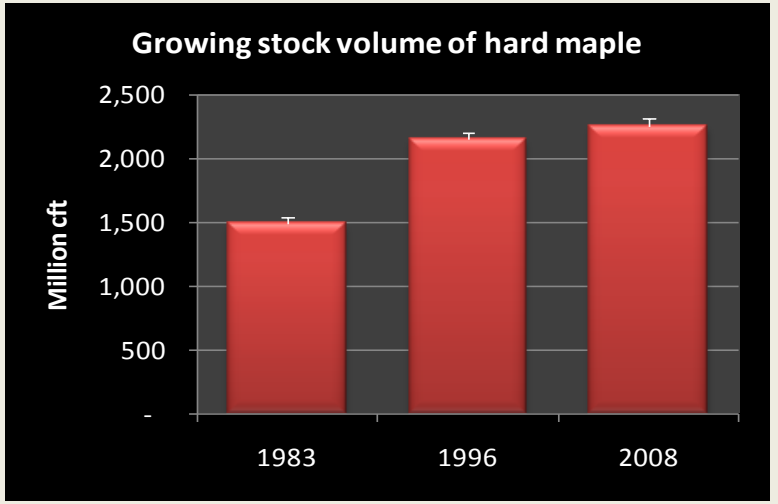


Chart 1. Growing stock volume (million cubic feet) by inventory year.
Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

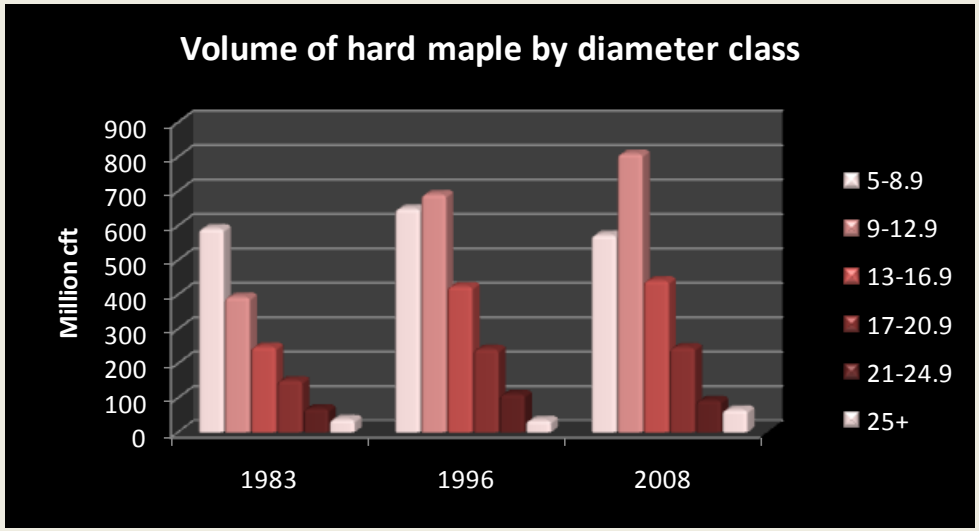


Chart 2. Growing stock volume (million cubic feet) in 1983, 1996, and 2008.
Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

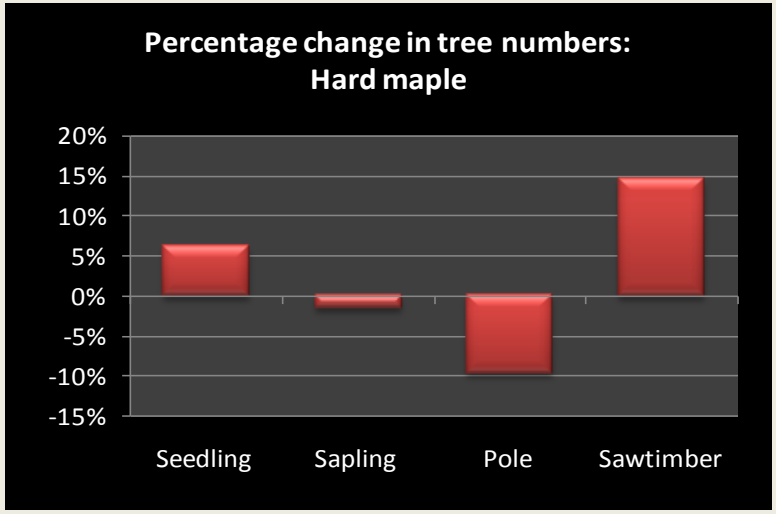
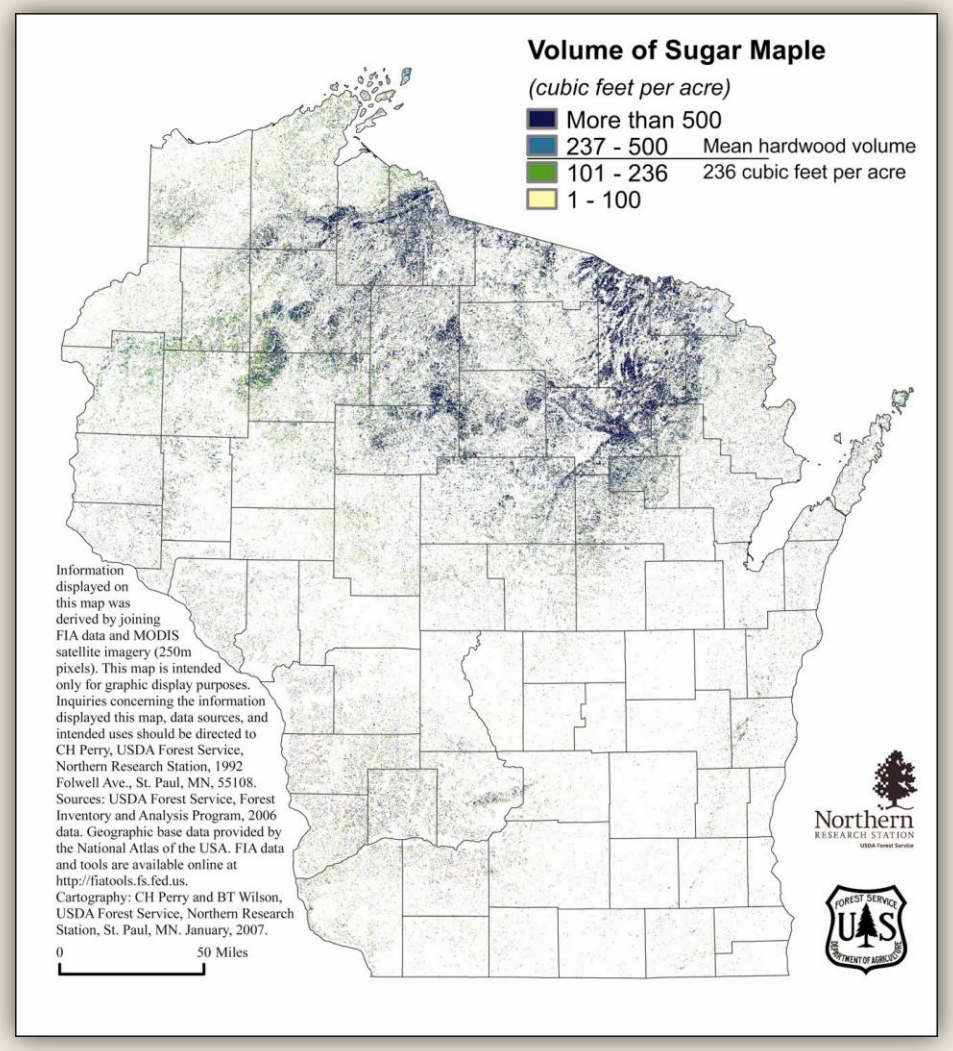


Chart 3. Percentage change in the number of live trees by size class between 1996 and 2008.
Source: USDA Forest Inventory and Analysis data 1996, and 2008.

"Where does hard maple grow in Wisconsin?"

Growing stock volume by region with map



About 82% of hard maple volume is located in northern Wisconsin with another 12% in the south (Table 1). It is a major component of the maple-basswood forest type and a minor component of oak-hickory and aspen-birch types.

Table 1. Growing stock volume (million cft) by species and region of the state.

Species	Central	North east	North west	South east	South west	Total	Percent of total
Black Maple	0	-	-	0	6	7	**0.3%**
Sugar Maple	142	999	832	112	167	2,251	**99.7%**
Total Hard Maple	142	999	832	112	173	2,258	**100.0%**
Percent of total	**6%**	**44%**	**37%**	**5%**	**7%**	**100%**	

Source: USDA Forest Service, Forest Inventory and Analysis 2008 data

Additional tables:

Volume by county in 2008 (pdf; Excel)

"How fast is hard maple growing?"

Average annual net growth by region and year

The average annual net growth rate of hard maple is about 57 million cft/year, or 10% of total volume growth in the state (Chart 4). The rate of growth has increased 22% since 1983 but remained statistically unchanged since 1996.

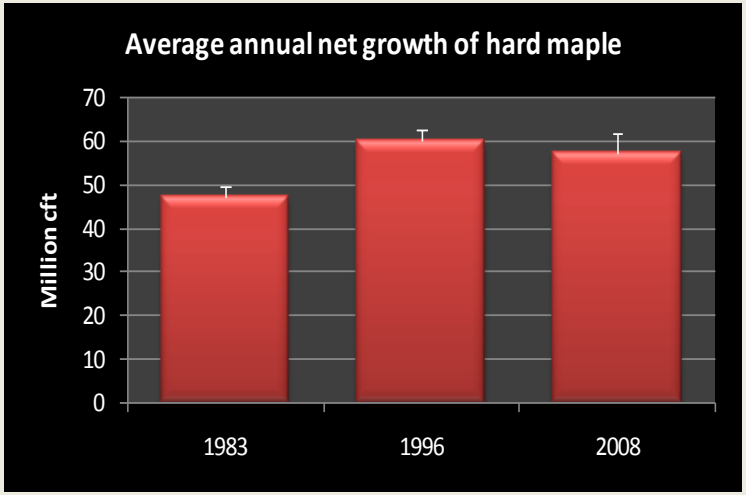


Chart 4. Average annual net growth (million cubic feet).
Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Table 2. Average annual net growth (million cft/year) of growing stock and the ratio of growth to volume by region of the state.

Region	Net growth	Percent of Total	Ratio of growth to volume
Central	4.3	7%	**3.0%**
Northeast	24.6	43%	**2.5%**
Northwest	20.6	36%	**2.5%**
Southeast	2.6	5%	**2.3%**
Southwest	5.1	9%	**3.0%**
Statewide	**57.3**	**100%**	**2.5%**

Source: USDA Forest Inventory and Analysis 2008

Although northern Wisconsin has the highest percentage of volume growth in hard maple, 79%, the ratio of growth to volume is lowest in this part of the state (Table 2). The average statewide ratio for hard maple is 2.5%, slightly lower than the 2.8% for all species in the state. Sugar maple is a shade tolerant, slow-growing species.

Additional tables:
Average annual growth, mortality and removals by region (Pdf, Excel).

"How healthy is hard maple in Wisconsin?"

Average annual mortality: 1983, 1996, and 2008

Average annual mortality of hard maple, about 4.6 million cft per year, has decreased 22% since 1996 (Chart 5).

The ratio of mortality to gross growth is only 7.4% for hard maple (Table 3). This is **much lower than the statewide average** of 26%. Whereas sugar maple accounts for 11% of total growing stock volume in the state, it makes up only 2.2% of total mortality.

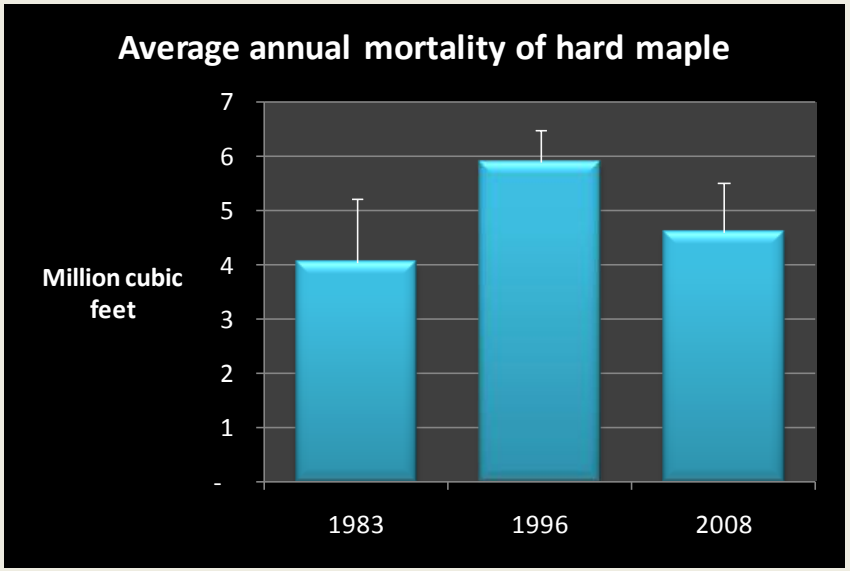


Chart 5. Average annual mortality (million cubic feet) by inventory year.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Table 3. Mortality, gross growth, and the ratio of mortality to gross growth.

Species	Average annual mortality (cft)	Average annual gross growth (cft)	Mortality / growth
Sugar Maple	4,594,747	61,896,309	**7.4%**

Source: USDA Forest Inventory & Analysis data: 2008

Additional tables:
Average annual growth, mortality and removals by region (Pdf, Excel).

"How much hard maple do we harvest?"

Roundwood production by product and year

Sugar maple is a very important timber species in Wisconsin. In 2003, the state produced about 56.5 million cft of hard maple or 14% of total roundwood product (Chart 6). At that time, half of production was for pulpwood and 37% for sawlogs.

In 2006, sugar maple pulpwood production had decreased 19 million cft or 51% from 2003 levels. This species accounted for 14% of all pulpwood production in the state in 2006.

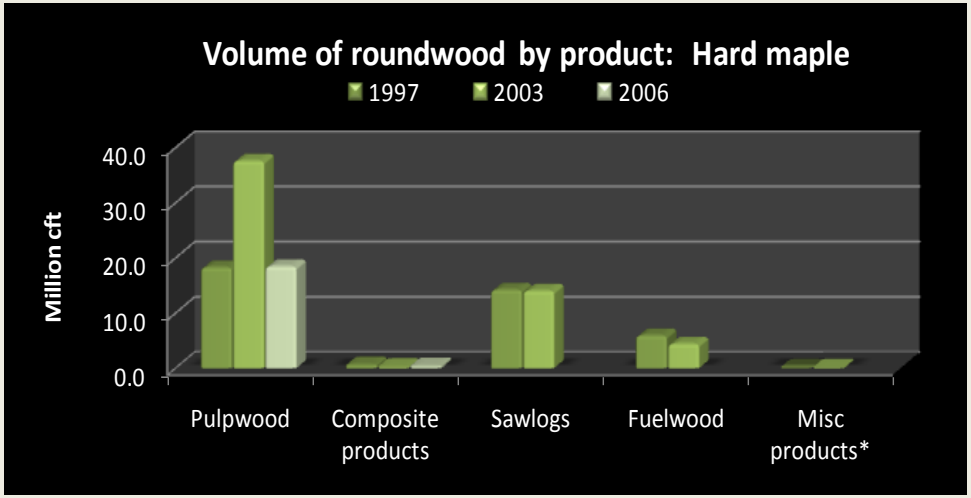


Chart 6. Volume of roundwood products. The most recent numbers for pulpwood and composite products are from 2006 and the most recent numbers for sawlogs, fuelwood and miscellaneous products are from 2003 (Ron Piva).
* Miscellaneous products include poles, posts, pilings and veneer.
Source: Timber Products Output Mapmaker, http://ncrs2.fs.fed.us/4801/fiadb/rpa_tpo/wc_rpa_tpo.ASP

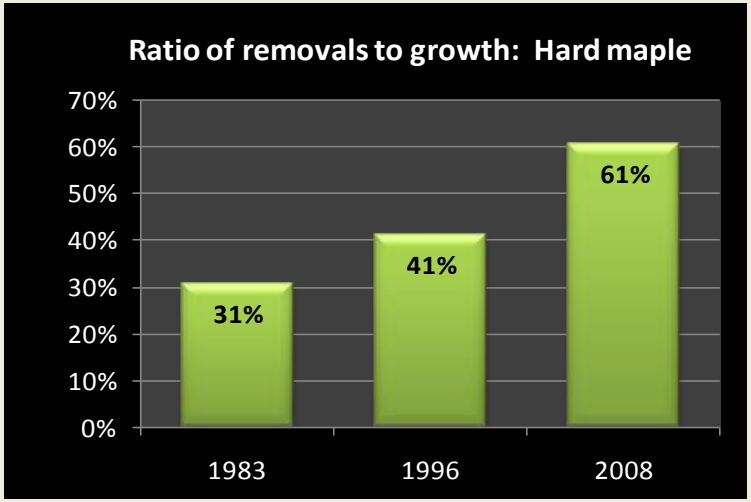


Chart 7. Ratio of volume harvested annually to net growth.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008.

The ratio of removals to growth for hard maple is 61%, slightly higher than the statewide average of 59% for all species. This is probably due to a lower than average growth rate.

Additional tables:
Average annual growth, mortality and removals by region (Pdf, Excel).

"How much is hard maple selling for?"

Prices for cordwood and sawtimber: 2000 to present

Due to the variability of timber prices from year to year and region to region, two methods of reporting prices are presented here: Timber Mart North and the weighted average stumpage prices from Wisconsin Administrative Code Chapter NR46.

Sawtimber prices, as reported in the Timber Mart North (Chart 8), have decreased since 2000.

Hard maple cordwood and sawlog prices, as reported in NR46 (Table 4), peaked in 2006 and have decreased since then. Sawlog prices, however, are substantially higher than the statewide average for all hardwood species.

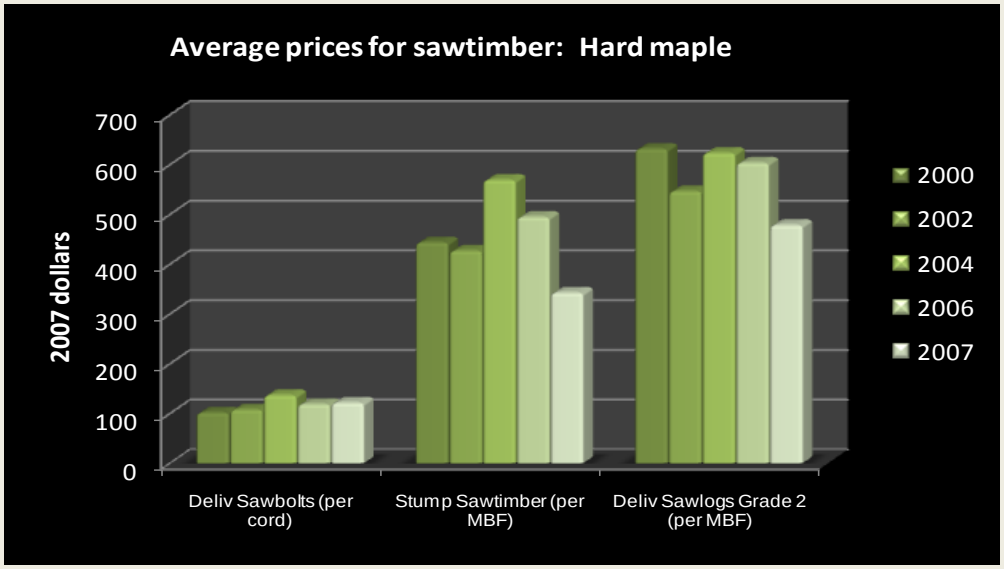


Chart 8. Average prices for cordwood and sawtimber (2007).
Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2009

Table 4. Average weighted stumpage prices (adjusted for inflation to 2009 dollars) by year for Wisconsin.

Product	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average for all hardwoods
Cordwood (per cord)	$14	$35	$16	$21	$38	$37	$51	$54	NA	**$24**	$19
Logs (per MBF)	$475	$433	$415	$427	$465	$542	$682	$552	$355	**$345**	$140

Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2009

"How much hard maple biomass do we have?"

Oven-dry tons by region of the state

There were 78.8 million oven-dry tons (ODT) of hard maple biomass in 2008, a decrease of 4 million ODT or 5%, from 1996. This species represents 13.2% of all live biomass statewide. As with volume, most hard maple is located in southern Wisconsin (Chart 9).

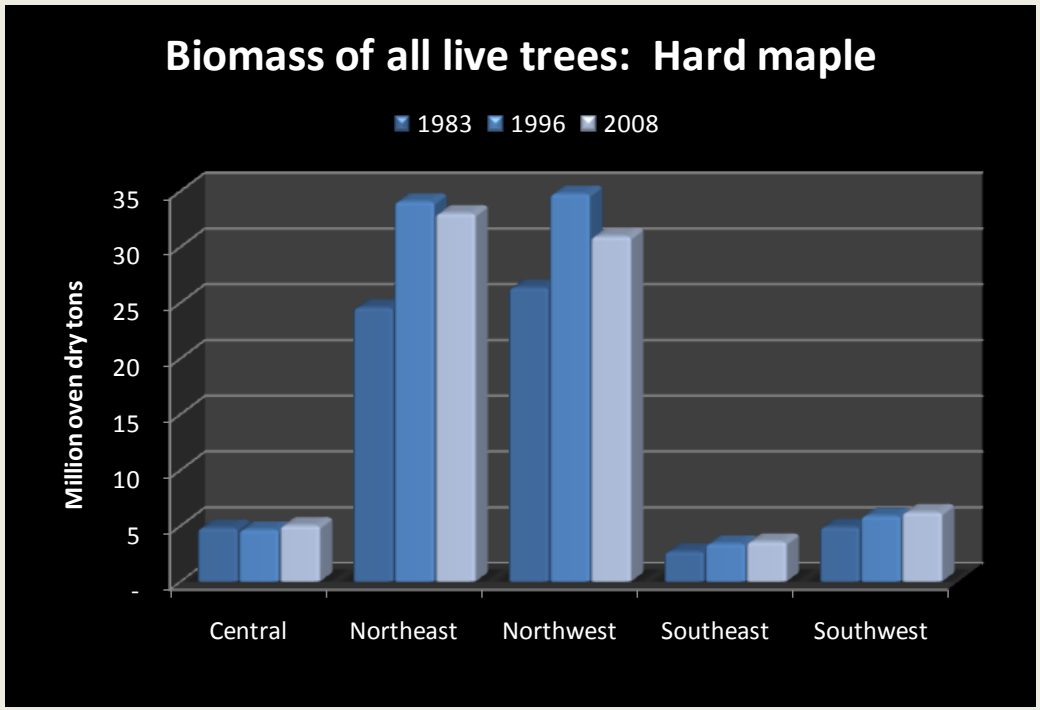


Chart 9. Biomass (million oven-dry tons) by year and region.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

Hard maple has a much higher density than other commercial hardwood species in Wisconsin, with a ratio of biomass to volume of 57.8 oven-dry lbs. per cubic foot (ODP/cft). The average for all hardwoods is about 50.1 ODP/cft and for all species is 46.8 ODP/cft. Approximately, 75% of all hard maple biomass is located in the main stem and 21% in branches.

The amount of hard maple as well as the high density of its wood may make it a valuable species for biomass production.

Additional tables: Biomass by county in 2008 (pdf; Excel)